보건학석사학위논문

Structural and Proximate Determinants of Fertility in Ethiopia

에티오피아 출산력의 구조적 및 근결정요인

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보건학과 보건인구학 전공

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Abstract

Structural and Proximate Determinants of Fertility in Ethiopia

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Introduction: Sub-Saharan Africa is still experiencing a high fertility rate with projections of population growth into the near future. To slow down the exponential increase in population and lower fertility rate, determinants of fertility need to be identified. While previous research identified many determinants, there are limited publications on the effect of ethnicity on fertility for Ethiopia even though it was found to be significant in some sub-Saharan countries.

Objectives: The main objective of this research was to determine if ethnicity exerts an independent effect on fertility in Ethiopia.

Method: Data for 7025 married women from "Determinants of Fertility in Ethiopia: A National Survey" that was conducted between December 2016 and January 2017 was used. The dependent variable was the number of live births per women. The explanatory variables can be divided into two categories – socio-demographic and fertility decision variables. Under socio-demographic variables are region, woreda type, woman's age, education status,

religion, woman's occupation, cohabitation status, age of first marriage, number of husbands, type of marriage, husband's age, husband's education status, and husband's occupation. Fertility decision variables include ever had abortion, heard of family planning, contraception use, intention to use family planning, ideal child number, have sex preference, family planning decision by, decision to stop family planning by, decision to use contraception, and number of children decided by. Data analysis was done using R. Generalized linear regression quasi-Poisson method was used to analyze the data.

Results: The results showed that women of different ethnicities experience different number of live births and differ in socio-demographic and fertility decision characteristics. Controlling for other variables, ethnicity still produced differences in the number of live births per women for select ethnicities. Determinants of fertility differed for individual ethnicities but three were consistently found in women of all ethnic groups except in those from Wolayata – woman's age, age when first married, and ideal child number.

Conclusion: Our results provide tentative support for ethnicity as a determinant of fertility directly and indirectly. For certain ethnic groups, ethnicity directly affects the number of live births while for others ethnicity may affect fertility by influencing socio-demographic and fertility decision variables. Implementing policy to raise the initial age of marriage, lower the desired fertility, and tailoring fertility policy to target Tigraway are methods that could lower fertility in Ethiopia.

Keywords : Ethiopia, Ethnicity, Fertility, Determinants

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1. Introduction

1.1 Purpose of the study

Globally, fertility has declined. However, sub-Saharan Africa still has a high fertility rate that poses a burden on socio-economic development. To reduce this burden, collaboration between local and international partners to promote family planning and fertility control is occurring.

Ethiopia is the second largest country in sub-Saharan Africa but other than the data collected by the Demographic Health Survey, not much comprehensive data has existed to allow for fertility research in Ethiopia. Furthermore, there is no comprehensive research on the effect of ethnicity on fertility in Ethiopia. Thus, the purpose of this study is to use data from a recent survey, “Determinants of Fertility in Ethiopia: A National Survey”, a nationwide survey carried out by the Ethiopian government in collaboration with the Korean government and higher education institutes, to find out the relationship of ethnicity and fertility in Ethiopia.

1.2 Ethiopia

Ethiopia is a landlocked country located on the Horn of Africa, in close proximity to the Middle East. It shares its borders with Eritrea, Djibouti, Somalia, Kenya, South Sudan, and Sudan. Ethiopia covers an area of about

1.1 million sq. km. The lowest point of the country is the Danakil Depression, which is 125 meters below sea level while its highest location is Ras Dahsen, 4,550 meters above sea level. The climate is tropical monsoon but the weather can vary widely by topography with temperatures between 47 and 10 degree Celsius. (CIA, 2017)

The capital city of Ethiopia is Addis Ababa. Ethiopia is divided into 9 ethnically based states – Afar, Amara (Amhara), Bindshangul Gumuz, Gambela Hizboch (Gambela Peoples), Hareri Gizb (Harari People), Oromiya (Oromia), Sumale (Somali), Togray, Ye Debub Biheroch Bihereseboch na Hizboch (Southern Nations, Nationalities and Peoples), and 2 self-governing administrations – Adis Abeba (Addis Ababa), and Dire Dawa. While the states may be divided by ethnicity there are more ethnic groups than the number of states. In order of largest proportion is Oromo 34.4%, Amhara (Amara) 27%, Somali (Somalie) 6.2%, Tigray (Tigrinya) 6.1%, Sidama 4%, Gurage 2.5%, Welaita 2.3%, Hadiya 1.7%, Afar (Affar) 1.7%, Gamo 1.5%, Gedeo 1.3%, Silte 1.3%, Kefficho 1.2%, and other 8.8%. As many ethnicities exist, there are many languages used within the country. The official national language is Amharic but the most spoken language is Oromo and English is the major foreign language taught in schools. The main religion is Ethiopian Orthodox (43.5%), closely followed by Muslim (33.9%), and then Protestant (18.5%), traditional (2.7%), Catholic (0.7%), and other (0.6%). (CIA, 2017)

According to The.World.Bank (2017) Ethiopia's population has been steadily increasing over the past 50 years with the total population estimated to be just above 102 million people in 2016 (Figure 1).

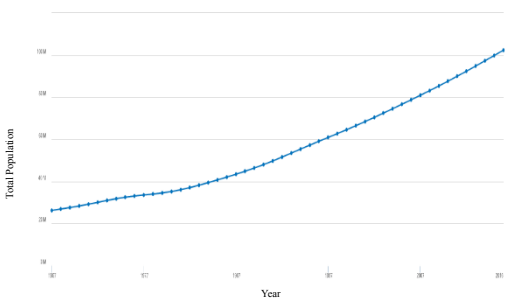

Figure 1. Population of Ethiopia from 1967 to 2016

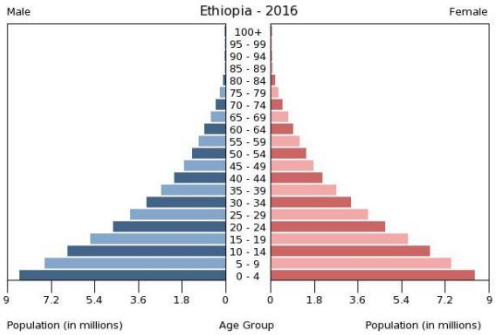

Figure 2. Population Pyramid of Ethiopia, 2016

The population pyramid reflects the typical pyramid structure of a developing society (Figure 2). In 2016, 41.1% of the total population were those between 0 and 14 years of age, 55.4% between the ages of 15 and 64, and 3.5% over 65 years of age. While the dependency ratio i.e. the ratio of dependent young and old people to the productive age group, is high (80.5% of working-age population), it has been steadily decreasing over the last decade. Life expectancy at birth has also increased over the last 50 years from 42 to 65 years old while the crude death rate has steadily decreased to 9 deaths per 1,000 people. Mortality rates are high, as of 2016, neonatal mortality rate is 27.6 per 1,000 live births and under-5 mortality rate is 58.4 per 1,000 live births, but has been steadily decreasing. (The World Bank, 2017)

In 1993, Ethiopia's first national population policy was implemented (Afr.Popul.Newsl, 1994). The aim of this policy was to increase the use of

contraceptive from 4% to 44% by 2015 through Information, Education and Communication programs (IEC). In 2016, Ethiopia's total fertility rate of 4.2 with contraceptive use at 37% (PRB, 2017). The difference in fertility rate by area of residence, i.e. urban and rural, is about three children with fertility rate for urban women at 2.3 and rural women at 5.2. Furthermore, the statistics for teenage pregnancy and motherhood is also in stark contrast with 4.9% in urban areas and 14.8% in rural areas. Addis Ababa, the capital city of Ethiopia and arguably the most developed area has the highest contraception rate at 55.9% while Somali (region of Ethiopia) has the lowest contraception rate at 1.5%. The differences are immense not only in contraception use or in teenage pregnancy among rural and urban areas but also between regions. (Central Statistical Agency - CSA/Ethiopia & ICF, 2017)

Other family planning services include those provided by the Ministry of Health, which offers maternal and child health (MCH) and Family program (FP) services. Ethiopian Family Guidance Association with International Planned Parenthood Association and other non-governmental stakeholders have tried to increase participation in FP but have not been able to satisfy the need. So, as pointed out by Entwisle and Mason (1985), women's fertility will depend on the background characteristics of the women.

1.3 Research Questions

1. Are there fertility differentials and differences in socio-demographic and fertility decision characteristics between women of different ethnic groups?
2. If all socio-demographic and fertility decision variables are controlled for, would there still be differences in fertility due to ethnic differences?
3. Are the socio-demographic and fertility decision variables related to fertility differently in different ethnicities?

2. Literature Review

2.1 Ethnicity and Fertility

Theoretical Framework

There are several attempts at explaining fertility differentials between ethnic groups living with a country. One of them is the Social Characteristics hypothesis (Petersen, 1969). It states that the fertility differences seen between different ethnic groups are due to the differences in socio-economic and demographic characteristics between the groups – there are no intrinsic differences between ethnicities and if all the relevant variables are controlled then there would be no differences in fertility between ethnic groups.

A rivaling hypothesis is the one proposed by Goldscheider and Uhlenberg (1969) – the Minority Group Status hypothesis. This hypothesis states that minority group status acts as an independent variable to socioeconomic and demographic characteristics to depress fertility due to a desire for social mobility among these members. While controlling for socioeconomic and demographic characteristics may decrease the fertility difference between majority group members and minority group members, there will remain significant differences.

A hypothesis that is derived from the Minority Group Status hypothesis is the Cultural/Particularized Ideology hypothesis. This was proposed by Kritz

and Makinwa-Adebusoye (1994) and states that there are significant differences in fertility between ethnic groups but those differences are due to differences in culture that differentially value fertility-related behavior and/or determine the usage of the given resources (socio-economic and demographic characteristics). This hypothesis allows for variables other than ethnicity to determine fertility but also provides a framework that does not dismiss the importance of ethnic identity. Unlike the Minority Group Status hypothesis, it is not limited to explaining fertility differentials between minority and majority group members.

Literature that have studied ethnicity and fertility in Africa dates back to 1989 (K. T. Kollehlon, 1989). It used the 1974 Liberian census data and supported the Social Characteristics hypothesis. Another research paper that found results to support the Social Characteristics hypothesis is a study done by Addai and Trovato (1999) using the 1993 Ghana Demographic and Health Survey data.

There is evidence to support the Cultural/Particularized Ideology hypothesis – broadly, there is significant fertility differentials by ethnicity when other variables are controlled. One of them is the study done in Congo (David Shapiro & Tambashe, 1998) and another in Cameroon (Clignet & Sween, 1978). A study done more recently in Nigeria also found in favor of the cultural/particularized ideology hypothesis (Konia T Kollehlon, 2003).

Factors that affect fertility

Several factors have been found to affect fertility. Bongaarts, Frank, and Lesthaeghe (1984) gives a list of proximate determinants that affect fertility; these are: Proportion of women married or in sexual unions, frequency of intercourse, postpartum abstinence, lactational amenorrhea, contraception, induced abortion, spontaneous intrauterine mortality, natural sterility, and pathological sterility. Education and employment was also found to be factor that directly affected fertility and also indirectly via the proximate determinants of fertility (D. Shapiro & Tambashe, 1997). It was also found that the age of childbearing influences the total number of children the woman will bear in the absence/low usage of contraception (Gyimah, 2003). Caldwell and Caldwell (1990) have suggested that in sub-Saharan Africa traditional social structure and belief system may play an important role in determining fertility. Konia T Kollehlon (2003) found that husband's approval of family planning was significant in determining the number of children the woman bore.

Research that test for variables that influence fertility between ethnic groups are available. In Kenya, using the Kenya Demographic and Health Survey data, Khasakhala (2011) found that there were differences in fertility rate between ethnicities and that different variables influenced the ethnic groups differently with index of marriage being most influential in inhibiting

fertility in most ethnic groups and postpartum infecundability being the factor for other ethnic groups.

2.2 Ethiopia and Fertility

Several studies were done on Ethiopia's fertility. A recent research focused on a town in south-central Ethiopia to find out the determinants of fertility in Ethiopia (Mekonnen & Worku, 2011). The researchers found out that delayed marriage, higher education, smaller family, absence of child death experience, living in food-secured households, and having a sex preference were associated with lower fertility rates in rural Ethiopia. Another study that focused on the northwestern region of Ethiopia used the Bongaarts' model and found that the determinants of fertility was postpartum infecundability, contraceptive use, and non-marriage (Alene & Worku, 2009). A study done in Southern Ethiopia (Gebremedhin & Betre, 2009) found many sociodemographic characteristics such as educational status, income, rural/urban place of birth, marriage age, and other variables such as husband's attitude toward contraceptive use, education of husbands, desire for children to be significantly correlated to fertility.

A study that focused on Ethiopia as a whole determined that the desired family size are strong predictors of the number of children born to a woman (Bhargava, 2007). Another study that looked at the whole of Ethiopia found

two interesting observations (Lakew, Reda, Tamene, Benedict, & Deribe, 2013). The first was that being in a monogamous relationship was a variable that predicted use of modern contraceptive (a known factor that lowers fertility). This is an interesting observation as polygamous marriages are banned under the Family and Criminal Code of Ethiopia (Chewaka, 2014). Second is that prevalence of contraceptive use was different by geography – higher in central and southwestern parts of the country than in the eastern and western areas.

2.3 Hypothesis

Taking into consideration the literature review, I hypothesize that

1. There are differences in fertility, socio-demographic charactersitics, and fertility decision characteristics between women of different ethnic groups.
2. Even when socio-demographic and fertility decision variables are controlled, there will be differences in fertility between ethnic groups.
3. Different socio-demographic and fertility decision variables are significantly related to fertility for each ethnicity.

3. Data and Method

3.1 Data Overview

Data collected from the 2017 "Determinants of Fertility in Ethiopia: A National Survey" (DFENS) was used. This survey was conducted in collaboration between Mekelle University, Ethiopian Ministry of Health, and Korea International Coorperation Agency (KOICA) over two months, December 2016 ~ January 2017.

Figure 3. Map of the Regional and Zonal Areas

The target population of this survey were married men and women aged 15 – 59 and 15 – 49, respectively, in Ethiopia across five regions – Amhara, Oromiya, SNNPR, Tigray, Somali regions, and one city administration – Addis Ababa.

The sample size calculation was done using a Raosoft sample size calculator that has the following assumptions:

Where n= is the required minimum sample size

P= proportion of the target population over the total population (13.3%)

Z^2 = Z-value for 95% Confidence Interval

D= margin of error (1%)

Design effect of 2

10% non-response rate

Sampling occurred at a zonal level within the six regions. 30 zones were selected and districts within them were stratified according to rural and urban areas. Random sampling occurred in 69 urban and rural districts. The districts were further divided into enumeration areas, 3 enumeration areas from each district were chosen, 207 in total. The total sample size allocated to each area was proportional to area.

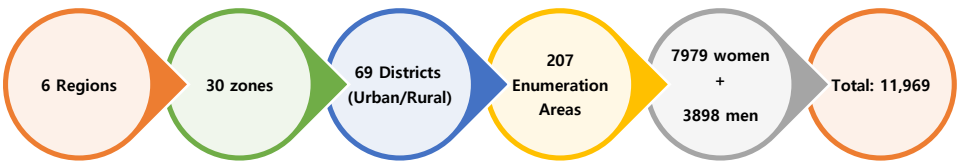

Figure 4. Schematic representation of Sampling Procedure

Before the survey, tool validation was done by different stakeholders. Upon validation, the questionnaire was translated into Amharic, Oromifa,

Tigrigna, and Somali, four local languages. 80 data collectors, with qualifications over BSc degree, were recruited and trained for 8 days. Questionnaires were changed into electronic forms using Research Electronic Data Capture (REDCap) software. The electronic questionnaire were accessed using smartphones by the trained data collectors. The main server was set up in Mekelle University and all phones were connected to this server. Answer parameters were set for each of the question which triggered an alarm in case the answers were not input correctly.

Questions on the following topics were asked: background characteristics (including age, education, and media exposure), birth history and childhood mortality, family planning, including knowledge, use, and sources of contraceptive methods, fertility preferences, antenatal follow up and breast feeding practices, women's work and husbands' background characteristics, infertility, and media related questions.

Only women's data was used in this study. 7696 women responded to the questionnaire. The data was made available in svg format, which was converted into csv format using R-foundation for statistical Computing and explored using excel and R (Team, 2014). Only 7025 respondent's data could be used for our study because of missing values.

3.2 Variables

Dependent Variable

Number of Live Births (NLB): the dependent variable is the number of live births the women who participated in this research experienced. The question that corresponds to this variable is 303 of the women's questionnaire, "How many times have you given birth? [I mean, to a child who ever breathed or cried or showed other signs of life – even if he or she lived only a few minutes or hours]. This is a continuous discreet variable.

Independent Variables

Independent variables can be divided into two parts. First, women's/respondent's socio-demographic variables, second, fertility decision characteristics. Under socio-demographic variables is ethnicity (Q207), region (Q101.A), woreda type (urban/rural) (Q101.C), woman's age (Q201), woman's education status (Q204), religion (Q206), occupation (Q208), cohabitation status (Q209), age at first marriage (Q211), number of husbands (Q213), type of marriage (Q214), husband's age (Q217), husband's education status (Q218), and husband's occupation (Q220).

Fertility decision characteristics were determined by if the woman has ever had an abortion (Q311), heard of family planning (Q401), ever used method to delay pregnancy (Q406), intention to use family planning (Q430),

ideal number of children(Q511/511.1), sex preference (Q309), who makes the decision to use family planning (Q701) and stop using family planning(Q702), reason for not using contraception (Q703), who decides number of children(Q704).

Dependent Variable	Independent Variable
Number of Live Births (NLB)	**Socio-Demographic measure**
	Ethnicity
	Region
	Woreda type
	Woman's age
	Education Status
	Religion
	Occupation
	Cohabitation Status
	Age of first marriage
	Number of husbands
	Type of marriage
	Husbands age
	Husband's Education Status
	Husbands occupation
	Fertility Decision Characteristics
	Ever had abortion
	Heard of family planning
	Method to delay pregnancy
	Intention to use family planning
	Ideal child number
	Have sex preference
	Family planning decision by
	Decision to stop family planning
	Decision to not use contraceptive
	Number of children decided by

Table 1. Summary of dependent and independent variables related to number of live births

3.3 Statistical Analysis – Poisson Model for Count Data

Poisson distribution is the probability distribution of occurrences of an event in a Poisson process; a Poisson process meets the three assumptions below:

1. There is a probability of an event occurring at least once during the given timeframe.
2. The event will not occur successively within a short timeframe.
3. Occurrences of the event within each timeframes are mutually independent.

Poisson distribution can also be interpreted as a limited form of the binomial distribution when the probability of success is small and number of trials are large. A random variable Y, with parameter μ, that takes on a discrete value i.e. an integer value, with probability

$$\Pr\{Y = y\} = \frac{e^{-\mu}\mu^{y}}{y!} \tag{3.1}$$

for $\mu<0$ is said to have a Poisson distribution. This means that the variance and mean of this variable have the below relationship

$$\mathrm{E(Y)} = \mathrm{var(Y)} = \mu \tag{3.2}$$

Assumption of homoscedasticity would not apply to Poisson data as any factor that affects either mean or variance will affect the other as well.

Our dependent variable is NLB by each woman, a discrete variable. However, the mean and variance for NLB of our data does not equal each other (mean = 2.904043; variance = 5.940385). This means that the data exhibit over-dispersion. Thus, quasi-Poisson regression that assumes the variance is proportional to the mean and adjust the standard error automatically was used.

4. Results

4.1 Descriptive Statistics

Table 2 gives a complete description of the sample. For each ethnicity there were different number of women who participated in the survey. However, the average ages of the mothers in each ethnic group was 31±1 years old.

The dependent variable to be examined was NLB by women of different ethnicities. The NLB by women of different ethnicities are different Somale and Wolayata women have the highest mean, 4.1 and 3.7 respectively. Oromo women have the next highest mean, 3.2, followed by Gurage and Agew, 3.1 and 3.0 respectively. The lowest mean NLB can be found among Sidama, Tigraway, and Amhara women, 2.7, 2.6, and 2.2 respectively.

The majority of women of each ethnicities live in a single region. However, only six regions were surveyed and there were women of eight different ethnicities so there was some overlap in the region they occupied. The majority of Wolayata, Sidama, and Gurage women can be found in Ethio-Somali. The majority of Amahara and Agew women lives in Amhara. Oromo women mainly lived in Oromia, Somale women in SNNP, and Tigraway women in Tigray.

Table 2. Mean and percentage distribution of selected socio-demographic and fertility decision characteristics for women, aged 15-49, of different ethnicity, Ethiopia, 2016

Selected Variables	ETHNIC GROUPS							
	Oromo	Tigraway	Amhara	Somale	Wolayata	Sidama	Gurage	Agew
Total Number of Women	1296	1039	2084	931	392	400	614	268
Number of Births (mean)	3.2	2.6	2.2	4.1	3.7	2.7	3.1	3.0
Region								
Tigray	0.0	88.7	1.0	0.0	0.0	0.0	0.0	0.4
Amhara	0.2	1.3	70.2	0.1	0.0	0.3	0.5	97.8
Oromia	80.9	1.3	9.0	2.4	4.8	2.0	12.1	0.0
SNNP	0.5	0.0	0.3	96.9	0.3	0.0	0.2	0.0
Ethio-Somali	1.1	0.1	1.1	0.0	87.0	95.0	63.4	0.0
Addis Ababa	17.4	8.5	18.4	0.6	7.9	2.8	23.9	1.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Woreda Type								
Rural	65.3	53.3	18.2	48.7	80.6	82.0	61.7	63.4
Urban	34.7	46.7	81.8	51.3	19.4	18.0	38.3	36.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Woman's Age	30.2	30.1	31.8	32.2	31.0	30.8	31.4	31.2
Education Status								
No Formal Education	52.9	40.9	30.8	84.7	57.9	29.3	48.0	74.6
Formal Education	47.1	59.1	69.2	15.3	42.1	70.8	52.0	25.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Religion								
Moslem	53.2	3.8	14.3	99.8	0.5	4.0	37.3	0.0
Orthodox	34.3	95.2	82.1	0.2	16.8	6.3	49.7	99.6
Catholic	0.4	0.3	0.6	0.0	5.6	2.8	4.7	0.0
Protestant	10.3	0.5	2.7	0.0	76.8	82.8	8.1	0.0
Other	1.9	0.2	0.2	0.0	0.3	4.3	0.2	0.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Occupation								
Housewife	11.0	41.1	45.5	61.1	78.3	61.3	62.1	53.4
Daily Laborer	8.0	2.4	5.3	21.2	4.1	1.3	6.5	3.4
Government Employee	8.5	8.3	14.3	4.1	4.6	9.0	4.4	4.9
Farmer	30.6	30.2	6.5	4.7	1.5	5.0	7.3	20.5
Merchant	11.2	16.0	20.1	7.9	6.9	17.3	12.5	11.9
Student	1.5	1.0	3.5	0.3	3.3	6.0	1.0	4.9
Other	29.2	1.1	4.9	0.6	1.3	0.3	6.2	1.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Cohabitation Status								
Do not live with husband	6.7	3.9	4.9	15.6	8.4	3.5	6.7	22.4
Live with husband	93.3	96.1	95.1	84.4	91.6	96.5	93.3	77.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Age of First Marriage	18.8	18.7	19.7	20.2	19.4	19.4	19.6	17.6
Number of Husbands	1.1	1.1	1.2	1.0	1.0	1.0	1.0	1.2
Type of Marriage								
Polygamous	13.2	7.2	12.4	13.0	2.0	4.3	5.0	11.9
Monogamous	86.8	92.8	87.6	87.0	98.0	95.8	95.0	88.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Husband's Age	37.7	38.3	38.7	41.0	37.0	36.8	38.2	40.2
Husband's Education Status								
No Formal Education	39.7	37.8	22.2	73.8	51.3	15.5	37.1	66.4
Formal Education	60.3	62.2	77.8	26.2	48.7	84.5	62.9	33.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Husband's Occupation								
Daily Laborer	15.7	12.9	9.9	43.0	4.8	5.3	14.5	2.2
Government Employee	17.3	19.2	35.1	19.2	14.5	21.8	11.1	13.8
Farmer	43.1	48.5	15.8	15.8	65.1	32.8	46.6	69.0
Merchant	13.3	13.5	26.3	18.9	11.7	33.5	21.5	10.8
Student	0.8	0.6	0.4	0.3	1.3	1.3	0.3	1.5
Other	9.9	5.3	12.5	2.8	2.6	5.5	6.0	2.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ever had Abortion								
No	83.2	89.4	86.6	85.4	92.1	92.0	82.9	90.7
Yes	16.8	10.6	13.4	14.6	7.9	8.0	17.1	9.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Selected Variables	ETHNIC GROUPS							
	Oromo	Tigraway	Amhara	Somale	Wolayata	Sidama	Gurage	Agew
Heard of Family Planning								
No	7.5	2.2	3.7	68.0	27.8	2.8	11.7	39.2
Yes	92.5	97.8	96.3	32.0	72.2	97.3	88.3	60.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Contraception Use								
No	41.1	43.1	23.3	95.1	50.5	23.8	48.0	62.7
Yes	58.9	56.9	76.7	4.9	49.5	76.3	52.0	37.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Intention to Use Family Planning								
Yes	66.6	77.6	75.0	9.0	56.4	81.5	65.1	48.5
No	30.1	19.8	18.2	77.0	28.1	12.0	27.0	29.1
Maybe	3.3	2.6	6.8	14.0	15.6	6.5	7.8	22.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ideal child number (mean)	4.8	4.5	4.2	10.0	5.4	4.1	5.1	4.8
Have Sex Preference								
No	68.0	67.4	21.2	95.3	76.5	22.0	55.2	36.2
Yes	32.0	32.6	78.8	4.7	23.5	78.0	44.8	63.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Family Planning Decision By								
Woman's Decision	7.3	6.1	13.5	1.2	21.4	10.3	16.8	3.0
Woman's and Husband's Decision	12.7	8.4	8.4	5.0	4.1	2.8	6.5	18.3
Husband's Decision	76.8	82.7	76.0	59.5	69.1	84.5	71.8	76.5
Other's Decision	3.3	2.9	2.1	34.3	5.4	2.5	4.9	2.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Decision to Stop Family Planning By								
Woman's Decision	7.3	6.1	15.2	1.2	22.2	15.8	19.1	3.0
Woman's and Husband's Decision	11.3	7.9	9.8	5.5	4.6	4.3	6.8	18.3
Husband's Decision	77.1	82.8	70.4	60.2	66.3	72.5	67.4	76.5
Other's Decision	4.2	3.3	4.7	33.2	6.9	7.5	6.7	2.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Decision to not use Contraception								
Woman's Decision	7.3	4.7	13.8	0.8	18.1	14.3	16.3	1.9
Woman's and Husband's Decision	13.3	8.3	10.7	4.7	3.8	6.0	11.7	19.8
Husband's Decision	73.6	86.2	71.6	61.2	71.4	75.3	67.8	74.6
Other's Decision	5.8	0.8	3.9	33.3	6.6	4.5	4.2	3.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of Children Decided By								
Woman's Decision	6.8	4.7	16.8	0.8	20.9	16.0	15.0	7.8
Woman's and Husband's Decision	16.5	4.7	8.5	2.7	4.3	5.3	7.3	16.4
Husband's Decision	71.3	89.5	71.5	66.8	70.4	77.5	74.9	73.1
Other's Decision	5.4	1.1	3.2	29.8	4.3	1.3	2.8	2.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

The distribution of women in urban and rural areas are not the same for each ethnicity. More than 80% of Wolayata and Sidama women live in rural areas while 80% of Amhara women live in urban areas. The distribution of women living in urban to rural is roughly equal for the other ethnicities but Oromo, Tigraway, Gurage and Agew ethnic groups have more women living in rural areas than urban areas; the exception is Somale with just above 51% living in urban areas.

The distribution of women who received formal education is different by ethnicity. The greatest proportion of Somale women did not receive any formal education. More percentage of women received formation education in Wolayata followed by Agew. Just under half of the Oromo women and just over half of the Gurage women received formal education. Around 60% of Tigraway women had received formal education. The highest proportion of educated women can be found in Amahara and Sidama.

The distribution of religion is not homogenous. More than 99% of Somale women are Moslem while the same proportion of Agew women are Orthodox Christians. Other ethnicities do not have such homogenous religious affiliation but Tigraway and Amara shows an overwhelming majority of Orthodox Christian women. Most Wolayata and Sidama women are Protestant Christians. Oromo and Gurage show a more heterogeneous distribution than other ethnicities with approximately 50% of women showing affiliation to one religion but the rest showing affiliation to other religions. However even in these two ethnicities Moslem and Orthodox Christians are the two most prominent religious with Protestant Christians taking a distant third place.

Housewife, a non-paid job, is the occupation of the majority (>50%) of Wolayata, Gurage, Sidama, Somale, and Agew women. The most number of Amhara women (45.5%) and Tigraway women (41.1%) are also housewives, but a large proportion of women in these two ethnicities also have paid jobs.

More than 20% of Amhara women are merchants while more than 30% of Tigraway women are farmers. Oromo women have a more diverse employment spectrum with the most number of them working as farmers but approximately 11% working as merchants, 8% of them working as daily laborers, and 8% as government employees.

Most women live with their husbands even though they are of different ethnicities. There are ethnic differences though. The largest proportion of women who do not live with their husbands is found among the Agew women – more than 20% of their married women do not live with their husbands. The next largest proportion is found among Somale women followed by Wolayata women.

Mean age of first marriage exceeds 20 years of age only for one ethnic group – Somale. However considering that Amhara, Wolayata, Sidama, and Gurage have a mean age of first marriage all around 19 years old, it is not impossible to say that women of these ethnic groups share a mean age of marriage. The lowest age of first marriage is about 17 years old and can be found in Agew women. Oromo and Tigraway women, on average, marry for the first time at about 18 years old.

Polygamy is still practiced in Ethiopia as evident in our results. While the number of women in a polygamous marriage is still low, women of all ethnicities are experiencing them. Wolayata have the lowest proportion of

women who are not the only wife to their husband. Oromo and Somale show the highest proportion of women who are married to husbands who have more than one wife.

The mean age of husbands lie within the late 30s and can reach up to 41 years old. The ethnicity with the youngest husbands is Sidama with an average age of 36.8 years old. The oldest husbands can be found in Somali with a mean age of 41.0 years old. Ethnicities, in order of youngest to oldest husband's mean age, is Sidama, Wolayata, Oromo, Gurage, Tigraway, Amhara, Agew, and Somale.

Somale has the least number of formally educated husbands. Ethnicity in order of increasing proportion of formally educated husbands is Sidama, Amhara, Gurage, Tigraway, Oromo, Wolayata, Agew, and Somale. Compared to women, the proportion of men who were formally educated compared to those not educated is higher.

The husband's occupation is quite diverse in most ethnicities. The greatest proportion of Oromo men are farmers with the rest distributed between those who are daily laborers, government employees, merchants, students, and those with other occupations. Tigraway and Gurage men show similar traits to Oromo men. Wolayata and Agew men are also mostly farmers but there are not many daily laborers compared to government employees and merchants. Sidama men show an almost equal distribution between

government employee, farmer, and merchant. Somale has the largest proportion of daily laborers. Amhara men's occupation is different to all other ethnic groups as a large proportion of men are merchants or government employees, while the proportion of those who work in sectors not mentioned in the survey is the largest among the ethnic groups represented here.

The proportion of women who have experienced an abortion is low in each of the ethnicity (<20%). The largest proportion of women who had an abortion are Gurage women followed by Oromo women and then Somale and Tigraway women – these are the ethnic groups with proportions greater than 10% of married women who have had an abortion. Less than 10% of women in the other ethnicities – Agew, Sidama, and Wolayata, have had an abortion.

Women who are ethnically Tigraway and Sidama are most likely to have heard of family planning while Somale women are least likely to have heard of family planning. Agew and Wolayata women are the next least likely to have heard about family planning. Less than 10% of Oromo, Tigraway, and Amhara women have not heard about family planning while 12% of Gurage women have not.

The largest proportion of Somale women have never used any method to delay pregnancy compared to other ethnicities. A majority of Agew women have not used any method to delay pregnancy as well. More Sidama and Amahara women have used some method to delay pregnancy than those who

have not. Among Oromo and Tigraway, Wolayata, and Gurage women, those who have used to delay pregnancy is roughly proportion to those who did not use any method to delay pregnancy.

Except for Somale women, majority of women of all other ethnicities answered that they are unsure of whether they would use family planning or that they intend to use family planning in the future. A majority of Somale women said they would not use family planning in the future even if it was available.

A greater proportion of women did not have a sex preference if their ethnicity was Oromo, Tigraway, Somale, Wolayata, or Gurage – Somali in particular, compared to those who did have a sex preference. On the other hand, larger proportion of Amhara, Sidama, and Agew women had a sex preference than those who did not.

For most women across ethnicities the decision to use family planning is not theirs but that of their husbands. More than 30% of Somali women, however, answered that "others" make the decision to use family planning. More Wolayata women seems to have autonomy than women of other ethnic groups – the proportion of Wolayata women who answered that it is the woman's decision to use family planning was the highest. Between ethnicities, most Agew women answered that it is the woman's and husband's decision to use family planning.

Without an exception, across all ethnicities, women answered that it is the husband's decision for the married couple to stop using family planning. A few things to note would be the high proportion of answers for "others" among Somale women. There were no follow-up question to who those "others" may be but it is an exception to the trend shown in the other ethnicities. Data for Wolayata women shows the highest proportion compared to women of other ethnicities who answered that it is the woman's decision to stop using family planning. The largest proportion of Agew women compared to women of other ethnicities answered that it is the joint decision of the husband and wife to stop using family planning.

Much like the trend shown for decision to use or not use family planning, the decision to use contraception is the husband's decision for most women across all ethnicities. An exceptionally high proportion of Somale women again answered that the decision to not use contraception is that of "Others". The largest proportion of Wolayata women again answered that it is the women's decision to not use contraception compared to women of other ethnicity. Agew women again show that they are different to women of other ethnicities with the largest proportion of them answering that it it the shared decision of the women and their husband to not use contraception.

For the majority of women of all ethnicity the number of children the women will have is decided by the husband. A large proportion of Somale

women again states “others” for those who decide the number of children the woman is going to have. Largest proportion of Wolayata women states that the number of children she is going to have is her own decision. The proportion of women who answered that the number of children is decided by both the husband and women is similar for both ethnic groups – Oromo and Agew.

4.2 Analytical Statistics

Examination of the data in Table 3 shows if there are ethnic fertility differentials in Ethiopia, controlling for socio-demographic and fertility decision variables. If controlling for socio-demographic and fertility decision variables eliminates the ethnic fertility differentials, then the results would support the social characteristics hypothesis. Conversely, if ethnic fertility differentials exist even after controlling for socio-demographic and fertility decision variables, then the cultural hypothesis would be better supported.

Model 1 examines the relationship between ethnicity and fertility using region and mother’s age as control. In this model, Tigraway, Amhara, Sidama, and Gurage women experience significantly lower NLB compared to Oromo women while Somale, Wolayata, and Agew women’s NLB do not have any statistically significant relationship with that of Oromo women (comparison group).

Table 3. GLM regression of number of live births for women of different ethnicity, aged 15~49, controlling for socio-demographic and fertility decision characteristics, Ethiopia, 2016

	Model 1	Model 2	Model 3
Ethnicity[a]			
Tigraway	-0.273*	-0.096	-0.110
	(0.062)	(0.059)	(0.057)
Amhara	-0.340*	-0.141*	-0.134*
	(0.035)	(0.034)	(0.033)
Somale	0.104	0.036	-0.017
	(0.080)	(0.077)	(0.076)
Wolayata	-0.033	0.049	0.043
	(0.049)	(0.051)	(0.050)
Sidama	-0.325*	-0.193*	-0.148*
	(0.053)	(0.054)	(0.053)
Gurage	-0.159*	-0.078*	-0.091*
	(0.042)	(0.040)	(0.038)
Agew	-0.013	0.016	0.063
	(0.053)	(0.051)	(0.050)
Region[b]			
Amhara	-0.230*	-0.108*	-0.120*
	(0.065)	(0.060)	(0.066)
Oromia	0.0120	0.109*	0.107
	(0.064)	(0.061)	(0.066)
SNNP	-0.126	0.236*	0.106
	(0.100)	(0.096)	(0.106)
Ethio-Somali	0.060	0.161*	0.173*
	(0.072)	(0.067)	(0.073)
Addis Ababa	-0.506*	-0.072	-0.089
	(0.060)	(0.058)	(0.045)
Woman's Age	0.064*	0.057*	0.055*
	(0.001)	(0.002)	(0.002)
Woreda Type[c]			
Urban		-0.093*	-0.060*
		(0.019)	(0.018)
Education Status[d]			
Formal Education		-0.178*	-0.162*
		(0.019)	(0.018)
Religion[e]			
Orthodox		-0.057*	-0.016
		(0.023)	(0.021)
Catholic		-0.04	-0.013
		(0.071)	(0.064)
Protestant		0.019	0.027
		(0.035)	(0.032)
Other		0.101	0.093
		(0.079)	(0.072)
Woman's Occupation[f]			
Daily Laborer		-0.005	0.019
		(0.029)	(0.027)
Government Employee		-0.133*	-0.123*
		(0.037)	(0.034)
Farmer		0.108*	0.086*
		(0.025)	(0.023)
Merchant		0.037	0.037
		(0.024)	(0.022)
Student		-0.678*	-0.655*
		(0.099)	(0.089)
Other		0.090*	0.073*
		(0.034)	(0.032)
Cohabitation Status[g]			
Live with husband		0.153*	0.130*
		(0.026)	(0.024)
Age when first Married		-0.052*	-0.045*
		(0.002)	(0.002)
Number of Husbands		-0.053*	-0.051*
		(0.019)	(0.017)
Type of Marriage[h]			
Monogamy		-0.044*	-0.043*
		(0.023)	(0.021)

	Model 1	Model 2	Model 3
Husband's Age		0.003*	0.002*
		(0.001)	(0.001)
Husband Education Status[i]			
Yes		0.028	0.01
		(0.019)	(0.018)
Husband's Occupation[j]			
Government Employee		0.003	-0.016
		(0.029)	(0.026)
Farmer		0.074*	0.075*
		(0.026)	(0.023)
Merchant		0.078*	0.055*
		(0.027)	(0.024)
Student		-0.209	-0.206
		(0.139)	(0.125)
Other		-0.004	-0.023
		(0.035)	(0.032)
Ever had Abortion[k]			
Yes			0.113*
			(0.017)
Heard of Family Planning[l]			
Yes			0.078*
			(0.021)
Contraception Use[m]			
Yes			0.070*
			(0.019)
Intention to Use Family Planning[n]			
No			-0.063*
			(0.020)
Maybe			0.02
			(0.028)
Ideal Child Number[o]			0.051*
			(0.002)
Have Sex Preference[p]			
Yes			-0.016
			(0.017)
Family Planning Decision By[p]			
Woman's and Husband's Decision			-0.101
			(0.0878)
Husband's Decision			-0.136
			(0.070)
Other's Decision			-0.150
			(0.079)
Decision to Stop Family Planning By[q]			
Woman's and Husband's Decision			0.247*
			(0.084)
Husband's Decision			0.177*
			(0.075)
Other's Decision			0.224*
			(0.083)
Decision to not use Contraception[r]			
Woman's and Husband's Decision			0.027
			(0.054)
Husband's Decision			0.012
			(0.043)
Other's Decision			-0.101
			(0.052)
Number of Children Decided By[s]			
Woman's and Husband's Decision			-0.072
			(0.040)
Husband's Decision			-0.016
			(0.028)
Other's Decision			0.110*
			(0.041)
Constant	-0.784*	0.087	-0.352*
	(0.070)	(0.090)	(0.095)
Observations	7,024	7,024	7,024

Reference Categories: [a]Oromo [b]Tigray [c]Rural [d]Never received formal education [e]Moslem [f]Housewife [g]Do not live with husband [h]Polygamy [i]Husband never received formal Education [j]Husband's occupation: Daily Laborer [k]Never had abortion [l]Never heard of family planning [m]Never used method to delay pregnancy [n]Have intention to use family planning [o]Do not have sex preference [p]Family planning decided by woman [q]Stop using family planning decided by woman [r]Contraception disuse decided by woman [s]Number of children decided by woman

Standard error in parentheses.

*p≤0.05

In model 2, where socio-demographic variables were added as controls, Amhara, Sidama, and Gurage women still show significantly lower NLB compared to Oromo women. However, there is no longer a significant difference between NLB by Oromo women and Tigraway women. The final model, which controls for all variables – socio-demographic and fertility decision variables, shows results similar to model 2 in that Amhara, Sidama, and Gurage women experience a significantly lower NLB compared to Oromo women. The coefficient for each of the three ethnicities for which ethnicity is a significant factor in determining the NLB decreases from model 1 to model 3. This shows that some of the fertility differentials may be explained by socio-demographic and fertility decision variables but ethnicity remains an important variable in determining NLB of Amhara, Sidama, and Gurage women in Ethiopia.

Women from Amahara and Addis Ababa have significantly smaller NLB than women from Tigray according to model 1. In model 2, this is no longer the case with women from SNNP and Ethio-Somali having statistically significant positive coefficients, not Amhara and Addis Ababa, i.e. women from these regions have more NLB than women from Tigray. In model 3, women from the region of Amhara experience a smaller NLB than woman from Tigray while the opposite is true for women from Ethio-Somali; women from Ethio-Somali experience a greater NLB. In all three models, the mother's

age is shown to be a significant factor on the NLB.

All variables, except religion (Orthodox) have shown to be statistically significant in model 2 and 3, in the same direction. In both models, women who live in urban areas experience a lower NLB than women living in rural areas. Women who have had received formal education have a lower NLB than women who have not received it. Women who work as government employees or are students have a lower NLB while those who work as farmers or have other jobs have a higher NLB than those who are housewives. Women who live with their husbands have a greater NLB than women who do not live with their husbands. The greater the age of marriage or the number of husbands, the lower the NLB. If the woman is the only wife to her husband, she would experience less NLB than a woman who has a husband with multiple wives. The greater the age of the husband, the greater the NLB the women would have experienced. Women with husband working as a farmer or a merchant would experience a greater NLB than women with husbands working as a daily laborer.

Compared to Moslems, Orthodox Christians were shown to have a significantly lower NLB in model 2. In model 3, this effect goes away – religious affiliation does not seem to have an effect on the NLB.

Model 3 shows the effect of fertility decision variables on the NLB Ethiopian women experience. Women who had an abortion, heard about

family planning, or have used any method to delay pregnancy experience a greater NLB than women who have never had an abortion, heard about family planning, or used a method to delay pregnancy, respectively. Those who do not intend to use family planning experience a lower NLB than those who intend to use family planning. Women with sex preference have significantly higher NLB. Compared to women who believes it is their own decision to stop using family planning, women who makes this decision with their husbands, women whose husband makes this decision by himself, or it is up to others to make this decision have more NLB.

Individual Ethnicity

In order to see if the different variables affect fertility differently by ethnicity, regression of NLB by socio-demographic and fertility decision characteristics was carried out for each ethnic group separately. The results are shown in Table 4.

The coefficients for region was only significant in Amahara women. Amhara women living in Oromia or Ethio-Somali experienced greater NLB than those living in Tigray. A point of interest would be the blanks in the table for region. Since regions roughly corresponds to ethnicity, certain ethnic groups do not live in certain regions at all.

Table 4. GLM regression of number of live births on socio-demographic and fertility decision characteristics for women, aged 15-49, of different ethnicity, Ethiopia, 2016

	ETHNIC GROUPS							
Selected Variables	**Oromo**	**Tigraway**	**Amhara**	**Somale**	**Wolayata**	**Sidama**	**Gurage**	**Agew**
Region[a]								
Amhara		0.096	0.076					0.432
		(0.102)	(0.125)					(0.944)
Oromia	-0.010	0.074	0.280*	0.819		0.48	0.888	
	(0.291)	(0.119)	(0.131)	(1.453)		(0.746)	(0.576)	
SNNP	-0.211		0.079	1.288	-0.855		0.632	
	(0.354)		(0.218)	(1.443)	(0.701)		(0.986)	
Ethio-Somali	-0.072	0.283	0.561*		0.318	0.307	0.778	
	(0.311)	(0.286)	(0.162)		(0.184)	(0.705)	(0.578)	
Addis Ababa	-0.359	0.018	0.163	0.695	-0.064	0.065	0.758	0.617
	(0.29)	(0.057)	(0.128)	(1.339)	(0.176)	(0.72)	(0.575)	(1.013
Woman's Age								
	0.065*	0.001	0.049*	0.057*	0.054*	0.063*	0.050*	0.046*
	(0.003)	(0.003)	(0.003)	(0.005)	(0.006)	(0.006)	(0.005)	(0.009)
Woreda Type[b]								
Urban	-0.089	0.015	0.02	-0.049	-0.009	0.097	-0.178*	-0.213*
	(0.05)	(0.026)	(0.042)	(0.052)	(0.101)	(0.071)	(0.085)	(0.086)
Education Status[c]								
Formal Education	-0.118*	-0.042	-0.137*	-0.342*	0.05	-0.065	-0.168*	-0.450*
	(0.038)	(0.03)	(0.034)	(0.092)	(0.064)	(0.054)	(0.049)	(0.156)
Religion[d]								
Orthodox	-0.059	0.02	-0.066	1.007	0.161	0.027	0.065	
	(0.036)	(0.051)	(0.035)	(1.100)	(0.496)	(0.141)	(0.043)	
Catholic	-0.023	-0.219	-0.113		0.131	0.385	0.084	
	(0.234)	(0.327)	(0.152)		(0.501)	(0.198)	(0.103)	
Protestant	-0.03	0.211	-0.116		0.17	0.265*	0.202*	0.454
	(0.045)	(0.172)	(0.092)		(0.495)	(0.107)	(0.078)	(0.991)
Other	0.112	-0.109	-0.029		-0.049	0.385*	-0.408	
	(0.09)	(0.289)	(0.234)		(0.843)	(0.147)	(0.807)	
Woman's Occupation[e]								
Daily Laborer	-0.187*	0.023	-0.071	0.205*	0.647*	0.137	-0.026	-0.374
	(0.088)	(0.08)	(0.067)	(0.055)	(0.22)	(0.274)	(0.100)	(0.243)
Government Employee	-0.181*	-0.113	-0.198*	0.13	0.101	-0.002	-0.019	-0.024
	(0.085)	(0.058)	(0.05)	(0.158)	(0.152)	(0.099)	(0.135)	(0.283)
Farmer	0.057	0.045	0.092	0.349*	-0.163	-0.208*	0.017	0.018
	(0.083)	(0.03)	(0.052)	(0.103)	(0.141)	(0.091)	(0.067)	(0.097)
Merchant	-0.016	0.031	0.017	0.231*	0.155	-0.113	0.041	0.051
	(0.08)	(0.036)	(0.034)	(0.087)	(0.099)	(0.071)	(0.068)	(0.123)
Student	-0.135	-0.905*	-0.972*	-1.428	-0.605*	-0.638*	-0.297	-0.976*
	(0.165)	(0.277)	(0.155)	(1.338)	(0.225)	(0.161)	(0.332)	(0.423)
Other	0.017	-0.196	-0.130	0.404	0.413	-0.104	0.018	0.088
	(0.079)	(0.127)	(0.07)	(0.314)	(0.277)	(0.773)	(0.116)	(0.383)
Cohabitation Status[f]								
Live with husband	0.211*	-0.08	0.206*	0.107	-0.025	-0.128	-0.024	-0.006
	(0.055)	(0.063)	(0.06)	(0.061)	(0.068)	(0.116)	(0.082)	(0.091)
Age when first Married	-0.041*	-0.004	-0.047*	-0.041*	-0.036*	-0.052*	-0.053*	-0.038*
	(0.005)	(0.004)	(0.003)	(0.008)	(0.008)	(0.007)	(0.006)	(0.011)
Number of Husbands	-0.084*	0.011	0.002	-0.055	-0.143	0.159	-0.062	-0.031
	(0.042)	(0.035)	(0.023)	(0.085)	(0.088)	(0.203)	(0.091)	(0.067)
Type of Marriage[g]								
Monogamy	0.005	0.107*	0.019	-0.185*	-0.194	0.083	-0.058	0.142
	(0.038)	(0.048)	(0.039)	(0.061)	(0.136)	(0.115)	(0.086)	(0.119)
Husband's Age	-0.0003	0.004	0.009*	-0.002	0.002	0.011*	0.003	0.008
	(0.002)	(0.002)	(0.002)	(0.003)	(0.005)	(0.005)	(0.004)	(0.006)
Education Status[h]								
Formal Education	0.018	0.03	0.01	0.022	0.03	0.108	-0.02	0.242
	(0.033)	(0.027)	(0.036)	(0.078)	(0.063)	(0.068)	(0.047)	(0.127)

Reference Categories: [a]Tigray [b]Rural [c]Never received formal education [d]Moslem [e]Housewife [f]Do not live with husband [g]Polygamy [h]Husband never received formal Education

Standard error in parentheses.

*p≤0.05

Selected Variables	ETHNIC GROUPS							
	Oromo	Tigraway	Amhara	Somale	Wolayata	Sidama	Gurage	Agew
Husband's Occupation[i]								
Government Employee	-0.058	0.051	0.049	-0.114	0.249	-0.001	0.059	0.252
	(0.06)	(0.049)	(0.052)	(0.086)	(0.171)	(0.13)	(0.098)	(0.366)
	(0.054)	(0.042)	(0.057)	(0.07)	(0.1750	(0.127)	(0.088)	(0.312)
Merchant	0.063	0.101*	0.028	0.034	0.530*	0.061	0.017	0.44
	(0.059)	(0.049)	(0.05)	(0.063)	(0.182)	(0.128)	(0.078)	(0.34)
Student	-0.103	-0.527	-0.665*	-14.22	0.623*	0.215	-0.378	0.449
	(0.203)	(0.32)	(0.306)	(350.674)	(0.291)	(0.285)	(0.48)	(0.544)
Other	0.03	0.048	0.032	-0.552*	0.32	0.136	-0.024	-0.244
	(0.064)	(0.065)	(0.056)	(0.171)	(0.223)	(0.151)	(0.11)	(0.403)
Ever had Abortion[j]								
Yes	0.061	-0.399*	0.083*	0.289*	-0.104	-0.126	0.067	0.003
	(0.032)	(0.034)	(0.032)	(0.055)	(0.068)	(0.081)	(0.05)	(0.112)
Heard of Family Planning[k]								
Yes	0.078	0.189*	0.138*	0.160*	-0.051	0.045	0.128*	0.066
	(0.05)	(0.084)	(0.068)	(0.057)	(0.059)	(0.154)	(0.058)	(0.0880
Contraception Use[l]								
Yes	-0.025	0.208*	0.057	0.051	0.054	0.240*	0.062	-0.016
	(0.035)	(0.026)	(0.038)	(0.134)	(0.065)	(0.078)	(0.054)	(0.123)
Intention to Use Family Planning[m]								
No	-0.151*	0.004	-0.127*	-0.194	0.063	0.036	-0.019	-0.224
	(0.037)	(0.031)	(0.041)	(0.109)	(0.06)	(0.09)	(0.058)	(0.128)
Maybe	0.068	0.1	-0.146*	-0.04	0.081	-0.134	-0.027	0.021
	(0.082)	(0.069)	(0.054)	(0.118)	(0.067)	(0.108)	(0.08)	(0.122)
Ideal Child Number	0.043*	-0.016*	0.074*	0.031*	0.100*	0.104*	0.086*	0.071*
	(0.006)	(0.007)	(0.006)	(0.005)	(0.014)	(0.017)	(0.01)	(0.019)
Have Sex Preference[n]								
Yes	0.056	0.009	-0.117*	0.107	-0.048	0.026	-0.082*	-0.026
	(0.031)	(0.025)	(0.036)	(0.104)	(0.053)	(0.06)	(0.041)	(0.097
Family Planning Decision By[o]								
Woman's and Husband's Decision	0.014	0.005	-0.293*	-0.322	-0.252	-0.07	0.07	-1.245
	(0.809)	(0.232)	(0.138)	(0.612)	(0.297)	(0.231)	(0.196)	(0.765)
Husband's Decision	0.005	-0.043	-0.236	-0.395	-0.309	-0.084	-0.081	-1.117
	(0.807)	(0.224)	(0.125)	(0.597)	(0.188)	(0.121)	(0.156)	(0.733)
Other's Decision	0.054	-0.08	-0.1	-0.434	-0.524*	-0.094	-0.192	-0.925
	(0.814)	(0.264)	(0.155)	(0.601)	(0.238)	(0.304)	(0.212)	(0.511)
Decision to Stop Family Planning By[p]								
Woman's and Husband's Decision	0.228	0.142	0.298*	0.38	0.263	0.328	0.178	0.849
	(0.811)	(0.243)	(0.15)	(0.777)	(0.307)	(0.279)	(0.216)	(0.726)
Husband's Decision	0.118	0.194	0.201	0.322	0.297	0.244	0.277	0.716
	(0.809)	(0.231)	(0.132)	(0.764)	(0.195)	(0.141)	(0.176)	(0.672)
Other's Decision	0.219	0.272	0.119	0.297	0.469*	0.244	0.488*	
	(0.816)	(0.267)	(0.15)	(0.766)	(0.236)	(0.255)	(0.216)	
Decision to not use Contraception[q]								
Woman's and Husband's Decision	-0.298*	-0.063	0.129	0.481	0.093	-0.173	0.053	1.296*
	(0.111)	(0.115)	(0.094)	(0.694)	(0.154)	(0.219)	(0.131)	(0.653)
Husband's Decision	-0.285*	-0.076	0.103	0.544	0.027	-0.207	-0.076	1.160
	(0.095)	(0.093)	(0.069)	(0.679)	(0.094)	(0.154)	(0.112)	(0.607)
Other's Decision	-0.428*	-0.286	0.227*	0.389	-0.201	-0.163	-0.488*	1.287
	(0.117)	(0.183)	(0.093)	(0.682)	(0.128)	(0.261)	(0.166)	(0.703)
Number of Children Decided By[r]								
Woman's and Husband's Decision	0.229*	0.081	-0.016	-0.126	-0.154	-0.269	-0.196	-0.288
	(0.088)	(0.093)	(0.065)	(0.45)	(0.132)	(0.165)	(0.114)	(0.224)
Husband's Decision	0.240*	0.059	-0.014	-0.243	0.123	0.068	-0.039	-0.269*
	(0.075)	(0.068)	(0.039)	(0.418)	(0.069)	(0.086)	(0.076)	(0.133)
Other's Decision	0.427*	0.331*	-0.024	-0.058	0.158	-0.036	0.032	0.115
	(0.099)	(0.141)	(0.079)	(0.424)	(0.119)	(0.226)	(0.15)	(0.508)
Constant	-0.443	-0.673*	-1.047*	-1.272	-1.268*	-1.929*	-0.898	-1.838
	(0.339)	(0.19)	(0.208)	(1.492)	(0.613)	(0.817)	(0.634)	(1.202)
Observations	1,296	1,039	2,084	931	392	400	614	268

[i]Husband's occupation: Daily Laborer [j]Never had abortion [k]Never heard of family planning [l]Never used method to delay pregnancy [m]Have intention to use family planning [n]Do not have sex preference [o]Family planning decided by woman [p]Stop using family planning decided by woman [q]Contraception disuse decided by woman [r]Number of children decided by woman

Standard error in parentheses.

*p≤0.05

Mothers' age had a positive and statistically significant effect on NLB for women of all ethnicities except Tigraway women. Another variable that was statistically significant for all women except Tigraway women is the age of first marriage. The results indicate that the NLB experienced becomes lower as the age of first marriage increases. Ideal child number is an interesting variables in that it is significant for women from all ethnic groups. However, for this variable too Tigraway women are an exception. Except for Tigraway women, as the ideal number of children increases, NLB increases.

Looking at other socio-demographic variables, Agew and Gurage women living in urban areas have lower NLB than those living in rural areas. Having a formal education (compared to those who did not have any formal education) reduces the NLB in Oromo, Amhara, Somali, Gurage, and Agew women but not in those of other ethnic groups. Sidama women who are either protestant or of other religious affiliation and Gurage women who are Protestants have more NLB than their Moslem counterparts.

Occupation is an important factor that determines the NLB a woman has in all ethnic groups except Gurage. However, the results are not straightforward. Compared to women who are housewives, Tigraway, Amhara, Wolayata, Sidama, and Agew women who are students have a lower NLB. Oromo women who are daily laborers or government employees, Amhara women who are government employees and Sidama women who are farmers

have a lower NLB than housewives from each of these ethnic groups. Somale women who are daily laborers, farmers or merchants and Wolayata women who are daily laborers have a higher NLB than their housewives counterparts.

Oromo and Amhara women living with their husbands experience higher NLB than those who do not. Only for Oromo women does the number of husbands matter, greater the number of husbands, lower the NLB experienced. Being the only wife for their husband affects the NLB positively for Tigraway women but negatively in Somale women. Husband's age is positively correlated to NLB only for Amhara and Sidama women. Husband's occupation matters for Tigraway, Amhara, Somale, and Wolayata women. For Amhara and Wolayata women, farmers as husbands, for Tigraway and Wolayata women, merchants as husbands, and for Wolayata women, husbands who are students, means greater NLB. For Amhara women who have students as their husbands or other choice of occupation means lower NLB.

Examination of fertility decision characteristics shows that for Tigraway women who have had an abortion NLB is lower than those who have not but is the opposite for Amhara and Somale women. Tigraway, Amahara, Somale, and Gurage women who have heard of family planning have a higher NLB than those who have not heard. Tigraway and Sidama women who have used any method of contraception show a higher NLB than those who have not used contraception. Oromo and Tigraway women who do not intend to use family

planning and Tigraway who are unsure of family planning use have a lower NLB than those who intend to use family planning. Amhara and Gurage women who have a sex preference have a lower NLB than those who do not.

Compared to Amhara women who said that it is the wife's decision to use family planning, those who said it is the woman's and husband's decision to use family planning had lower NLB. For Wolayata women, when it is others' decision to use family planning the NLB is lower than when the women decides alone. Depending on whose decision it is to stop using family planning, Amhara (Woman's and husband's), Wolayata (Others'), and Gurage (Others') women experience greater NLB than the control group. For Oromo women, decision to not use contraception made by anyone other than the women only have a negative effect on the NLB. For Agew women, the joint decision to not use contraception by the husband and women means greater NLB while for Gurage women, if it is other's decision to not use contraception, the woman experiences a lower NLB compared to when it is only the woman's decision. For Oromo women, when the number of children decided by anyone other than only the woman, the NLB are higher. When the number of children is decided by others, Tigraway women experience a greater NLB than when decided by only the woman. If the husband is the sole decision maker of the number of children, Agew women have a lower NLB than when the women make the decision alone.

5. Discussion and Implication

5.1 Discussion

The purpose of this study was to examine the possible fertility differentials by ethnicity in Ethiopia. To this end, three questions were posed at the beginning of the research. First, are there fertility, socio-demographic, and fertility decision characteristic differences between women of different ethnic groups? Second, are fertility differences due to differences in socio-demographic and fertility decision variables or is there an independent effect of ethnicity on fertility? Third, are socio-demographic and fertility decision variables related to fertility within each ethnicity differently?

In answer to the first question, there are fertility differences between women of different ethnic groups seen by the difference observed by the mean NLB per woman. Differences also exist in socio-demographic characteristics and fertility decision variables between ethnic groups.

The result of the multivariate analysis results give an answer to the second question. It shows that socio-demographic and fertility decision variables explains some of the differences in fertility between ethnic groups but that ethnicity is also a significant variable that determines fertility differentials in certain ethnic groups.

The effect of certain control variables were inconsistent with

expectations. Women's occupation generally has a negative impact on NLB (Gebremedhin & Betre, 2009) but if the woman were a farmer, she would likely have more children. This is consistent with the differing value placed on a child according to context i.e. in an agricultural setting children are seen as assets (Nafzinger, 2012). As the number of husbands increase, the NLB decrease. This may be explained by women being divorced due to childlessness within a given period after marriage (Tilson & Larsen, 2000) making these women remarry and increasing the number of husbands for these women.

Among fertility decision-making variables, there are many that do not align with general assumptions. Those who had an abortion, heard of family planning, or used contraception experienced greater NLB than those who have not had an abortion, not heard of family planning, or used contraception. Also, those who do not intend to use family planning have lower NLB than those who intend to use family planning. These results can be understood if use of family planning is interpreted as a means to stop pregnancy after achieving the desired family size (Agyei & Mbamanya, 1989; Konia T Kollehlon, 2003).

Another interesting trend to note is that only the decision to stop family planning, when made by the woman alone, means a significantly lower NLB than when the decision is made jointly with or only by the husband, or others. If family planning is thought to encompass child number, birth interval, and

contraception use, a woman who is able to make those decisions independently will, as literature suggest (Larsen & Hollos, 2003) want less children thus lowering NLB.

To answer the third question, individual dependent variable was regressed to the independent variable for each ethnicity. Different socio-demographic and fertility decision variable affect fertility in different ethnicities and sometimes in different magnitude and direction. This suggests that ethnicity affects socio-demographic and fertility decision variables that in turn affects fertility. When women from each of the ethnicities were examined separately, Tigraway women stood out. The variables that determine fertility in women of other ethnicities do not affect these women at all or affect them in the same way.

There were two variables that were significant for women of all ethnicities in the same direction except for Tigraway women. These two variables are woman's age and age when first married. A tentative explanation for the above results can be found in the relatively high infertility rate combined with high divorce rates among Tigraway women. A high percentage (>95%) of Tigraway women surveyed replied that they were Orthodox Christian and it has been found that Orthodox Christians have a higher proportion of childlessness than Moslem, the next largest religious group (Mammo & Morgan, 1986). Also, divorce is a common result for those women

who do not have children soon after marriage (Tilson & Larsen, 2000). The effect of infertility and high divorce rate due to infertility may have nullified the effect of woman's age and age when first married on NLB.

Another variable was significant for all women regardless of ethnicity but in the opposite direction for Tigraway women than other women. This variable is ideal child number – for most women wanting more children meant having more NLB but for Tigraway women wanting more meant smaller NLB. Tigray men may be behind this trend. Men from Tigray region (>88% of surveyed Tigraway women were from this region) emphasized big families (Mesfin, 2002) which could lead to women who have a low NLB to want a greater number of children than those who have experienced a high NLB.

Considering all the variables, it should be noted that statistically significant variables for each of the ethnic groups are not the same. While there are several variables that have an effect on the NLB in the same direction, i.e. positive or negative, these do not have the same amount of effect for each ethnic groups. Furthermore, some variables affect NLB in different directions, leading to more NLB in some ethnicities and lower NLB in other. It is worth considering ethnicity both as a variable that directly affects fertility and indirectly by affecting socio-demographic and fertility decision variables that act as determinants of fertility.

5.2 Implications

To lower the fertility across all ethnicities (with the exception of Tigraway), our analysis suggest that policy makers should target the age of first marriage. If the average age of initial marriage is raised, NLB over the lifespan of the woman should decrease.

Ideal child number has also shown to be a factor that affects all ethnicities. As expected, the greater the ideal number of children, the greater the number of children a woman would have. Considering that our results show that the ideal child number is much higher than the NLB experienced by women of most ethnic groups currently, policy makers should be warned that fertility might not show a decline in the near future. Promoting a smaller number of children could be a policy consideration.

Since Tigraway women have shown to be different from other tribes, policy makers should consider different policies for this ethnic group. Finding reasons behind this difference could help formulate policies that are more appropriate to this ethnic group. Also, compared to other ethnic groups more Tigraway women answered that fertility decision were made by their husband, targeting Tigraway men may help lower the fertility level of this ethnic group.

An interesting suggestion that can be gleaned from our results would be to advertise contraception or family planning as a means of achieving desired fertility rather than limiting fertility. Women with higher NLB tend to use

contraception or family planning, which means that women do not have anything intrinsically against contraception or family planning but its role. Advertising in this way may increase the acceptance of contraception and family planning in Ethiopian society.

6. Conclusion

Fertility decline is a worldwide phenomenon and Ethiopia is no exception. Nevertheless, Ethiopia is still experiencing a high fertility rate and an increasing population. Ethiopia is divided into regions that roughly corresponds to the different ethnic groups but since each region is not inhibited by only one ethnicity, this study used ethnicity as opposed to region to study the fertility differentials, if any, between the ethnic groups and the variables that gave rise to them.

There are indeed fertility differentials between the different ethnicities. Furthermore, different ethnicities have different socio-demographic and fertility decision characteristics. Controlling for socio-demographic and fertility decision variables show that ethnicity can have a significant effect on the NLB a woman experiences in her lifetime. Variables that are shown to effect the NLB for Ethiopian women in general are living in Amhara or Ethio-Somali region, woman's age, woreda type, education status, being a government employee, farmer, or student, cohabitation status, age of first marriage, number of husbands, type of marriage, husband's age, if husband is a farmer or a merchant, ever had abortion, heard of family planning, contraception use, intention to use family planning, and decision to stop family planning.

There are variables that affect some ethnicities' fertility rate but three variables affect all or most of the ethnicities. Looking at each of the ethnicities separately, Tigraway stands out. The greater the mother's age, the greater the NLB she would have experienced and greater the age of first marriage, smaller the NLB she would have experienced, except if she was a Tigraway woman. As the ideal child number increases so do the NLB a woman would have unless she was Tigraway i.e. the more children a Tigraway woman wants, the less NLB she would experience.

Implementing policy that can raise the age of marriage and/or lower the desired number of children may help lower the overall NLB by Ethiopian women. Targeting Tigraway men may be a circuitous way of reaching the Tigraway women to lower their fertility. Changing the way contraception/family planning is advertised – as a means to achieve the desired fertility rather than limit the number of children, may help the acceptance of contraception/family planning into society.

7. Limitations

This research was done using primary data at an individual level from a novel questionnaire. While this means that less information is lost during analysis compared to secondary data, the validity of the data might be called into question. Since this questionnaire is similar to the Ethiopian Demographic Health Survey (EDHS) questionnaire it would benefit from being validated by comparison with the 2016 EDHS data.

Data was collected to be representative at a regional and zone level and may not be representative for the different ethnicities. Furthermore, only 5 regions and 1 city administration was considered. Since not all regions were included in the survey, the regional effect on ethnicities could bias our results.

There are variables that have not been considered in this research that may be an important determining factor – such as sterility/infertility and wealth index that if added to our analysis would have made it more accurate and could account for fertility differentials between ethnicities.

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국문초록

에티오피아 출산력의 구조적 및 근결정요인

연구배경 및 목적: 아프리카는 여전히 높은 출산율을 기록하고 있으며 가까운 미래에 인구 증가가 예상된다. 기하 급수적인 인구 증가를 늦추고 출산율을 감소시키려면 출산율의 결정요인들을 파악해야 한다. 선행연구에서 에티오피아의 출산율 결정 요인들은 활발하게 규명되었다. 그러나 다른 아프리카 나라들에서 연구되어졌던 종족성에 관한 연구는 전무하다. 따라서 본 연구의 목적은 종족성이 출산력에 독립적인 영향을 미치는지 파악하고자 한다.

방법: 본 연구는 2016년 12월에서 2017년 1월까지 에티오피아에서 진행되었던 “에티오파아 출산율의 결정 요인: 전국조사” 설문조사 결과를 사용하였으며 최종적으로 7025명의 기혼 여성들의 자료를 분석하였다. 종속변수는로 출산횟수와 독립변수로는 문헌고찰으로 통해 출산에 영향을 미치는 요인들을 선발하여 활용하였다. 독립변수들을 크게 두 가지로 사회-인구학적 변수와 출산 의사결정 변수로 분류하였다. 먼저 사회-인구학적 변수로는 “종족”, “지역”, “Woreda 유형”, “여성의 나이”, “여성의 교육 수준”, “종교”, “직종”, “동거여부”, “초혼 연령”, “남편 수”, “혼인형태”, “남편 나이”, “남편 교육 수준”, “남편의 직종”이 있다. 출산 의사결정 변수로는 “유산경험”, “가족계획에 대해 들음”, “임신지연 방법 이용”, “가족계획 이용 의향”, “이상적인 아이수”, “선호하는 성의 유무”, “가족계획 이용 결정권”, “가족계획 정지 결정권”, “피임 이용 안하는 이유”, “이아의 수 결정권”이 있다. 자료는 유사 포아송 (Quasi-Poisson)모형으로 R을 활용하여 분석하였다.

결과: 기술 통계 분석 결과, 종족별 출산 횟수가 다름을 확인할 수 있었다. 더불어 다른 독립변수들도 종족에 따라 그 분포가 상이하였으며 다른 변수들을 통제하여도 여전히 종족성은 출산 횟수에 유의한 영향을 미치는 것으로 밝혀졌다. 그러나 Wolayata를 제외한 나머지 종족들의 여성의 나이, 초혼연령과 이상적인 아이의 숫자는 출산율에 결정요인으로 밝혀졌다.

결론: 최종적으로 종족성이 출산에 직간접적인 영향을 미침을 확인할 수 있었다. 다시 말해 종족에 따라 종족성이 출산에 직접적인 영향을 미치거나 사회 인구학적 혹은 출산의사결정 변수에 영향을 주어 간접적으로 출산에 영향을 미친다. 에티오피아의 출산을 감소시키는 방법으로 여성의 초혼 연령을 증가시킬 수 있는 정책을 만들고 이상자녀수를 감소 시키기 위한 캠페인을 실시하며 Tigraway의 경우 맞춤형 정책을 만들 수 있다.